

Arabidopsis thaliana FAE1 (SEQ ID NO:2)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSQKVM
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITQGIYAG ENRSMMSVNC LFRVGGAIL LSNGSGDRRR SKYKLVHTVR
 THTGADDSKF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGLPI
 LPLSEKFLFF ATFVAKKLLK DKIKHYVPD FKLAVDHFCI HAGGRAVIDE
 LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKW
 QIALGSGFKC NSAVWVALRN VKASANSFWQ HCIDRYPVKI DSDLSKSKTH
 VQNGRS

Brassica napus elongase KCS (SEQ ID NO:4)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYSYLQ
 HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
 DIFQVRKAD PSRNGTCDD SLDLFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMSVNC LFRVGGAIL LSNGPGDRRR SKYELVHTVR
 THTGADGSKF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
 LPLSEKLLFF VTFMGKKLFK DKIKHYVPD FKLADHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

B. napus elongase KCS (SEQ ID NO:6)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYLTIDDL HHHLYSYLQH
 NLITIAPLA FTVFGSVLYI ATRPKPVYLV EYSCYLPPTH CRSSISKVMD
 IFFQVRKADP SRNGTCDDSS WLDLFLRKIQ ERSGLGDETH PEGLLQVPPR
 KTFARAREET EQVIIGALEN LFKNTNVNPK DIGILVVNS MFNPTPSLSA
 MVVNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVHK NTYALVVSTE
 NITYNIYAGD NRSMMSVNC LFRVGGAIL LSNGPRDRRS KYELVHTVRT
 HTGADDSKFR CVQQGDDENG QTGVSLSKDI TDVAGRTVK NIATLGLPIL
 PLSEKLLFFV TFMGKKLFKDK EIKHYVPDF KLADHFCIH AGGKAIDVL
 EKNLGLAPID VEASRSTLHR FGNTSSSIW YELAYIEPKG RMKKGKNKWQ
 IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
 PNGRS

FIGURE 1-1

At114 (SEQ ID NO:8)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSQKVMQ
 IFYQIRKADT SSRNGTCDDSS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNCL LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVD FKLAI DHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDIRYPVKI DSDSGKSETR
 VPNGRS

At74 (SEQ ID NO:10)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPKPVYLV EYSCYLPPPH CRSSISKVMD
 IFYQVRKADP SRNGTCDDSS WLDFLRKIQE RSGLGDETHG PEGGLQVPPR
 KTFAAAREET EQVIIGALEN LFKNTNVNPK DIGILVVNS MFNPTPSLSA
 MVVNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVH KNTYALVVST
 NITYNIYAGD NRSMMVSNCL FRVGGAAIL SNKPGDRRRS KYELVHTVRT
 HTGADGKSF RCVQQGDDENG KIGVSLSKDI TDVAGRTVKK NIATLGPLIL
 PLSEKLLFFV TFMGKKLFKDK KIKHYYPDF KLAIDHFCIH AGGRAVIDVL
 EKNLALAPI VEASRSTLHR FGNTSSSSIW YELAYIEAK GRMKGKGNVWQ
 IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
 QNGRS

At114 L91C K92R (SEQ ID NO:12)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH CRVSVSKVMD
 IFYQIRKADT SSRNGTCDNS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNCL LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVD FKLAI DHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDIRYPVKI DSDSGKSETR
 VPNGRS

FIGURE 1-2

At114 K92R (SEQ ID NO:14)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPTH LRVSVSKVMD
 IFYQIRKADT SSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVVSNC LFRVGGAIL LSNDPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYVPD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDIRYPVKI DSDSGKSETR
 VPNGRS

At114 G307D (SEQ ID NO:16)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPTH LKVSYSKVM
 IFYQIRKADT SSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVVSNC LFRVGGAIL LSNDPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYVPD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDIRYPVKI DSDSGKSETR
 VQNGRS

At74 G306D (SEQ ID NO:18)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPKPVYLV EYCYLPPTH CRSSISKVMD
 IFYQVRKADP SRNGTCDDSS WLDFLRKIQE RSLGDETHG PEGLLQVPPR
 KTFAAAREET EQVIIGALEN LFKNTNVNPK DIGILVNSS MFNPTPSLS
 MVVNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVH KNTYALVVST
 NITYNIYAGD NRSMMVSNCL FRVGGAILL SNKPGDRRRS KYELVHTVRT
 HTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK NIATLGPLIL
 LPLSEKLLFF VTFMGKKLFK DKIKHYVPD FKLAIDHFCI HAGGRAVIDV
 EKNLALAPID VEASRSTLH RFGNTSSSIW YELAYIEAK GRMKGKGNKVW
 IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDIRYPVKI DSDSGKSETR
 QNGRS

FIGURE 1-3

At114 L91C K92R G307D (SEQ ID NO:20)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH CRVSVSKVMD
 IFYQIRKADT SSRNGTCDNS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVSNCLFRVGGAAIL LSNNKPGDRRR SKYELVHTVR
 THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

At114 K92R G307D (SEQ ID NO:22)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LRVSVSKVMD
 IFYQIRKADT SSRNGTCDDSSWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVSNCLFRVGGAAIL LSNNKPGDRRR SKYELVHTVR
 THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

At254 (SEQ ID NO:24)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNLLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNVACDDP SSDFLRKIQ ERSGLGDETH SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFENTKVNPR EIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVSNCLFRVGGAAIL LSNNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VPNGRS

FIGURE 1-4

At173 (SEQ ID NO:26)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPTH LKVSVSQVMD
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVMVSN LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQOGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLKF DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKW
 QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

Bn176 (SEQ ID NO:28)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYSSYLQ
 NLITITAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
 DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTKVNP REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITQGIYAG ENRSMVMVSN LFRVGGAAIL LSNKSGDRRR SKYKLVTHTVR
 THTGADDKSF RCVQOQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
 LPLSEKFLFF ATEVAKKLLK DKIKHYYPVD FKLAVDHFCI HAGGRAVIDE
 LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKW
 QIALGSGFKC NSAVVVALRN VKASANSPOW HCIDRYPVKI DSDLSKSKTH
 VQNGRS

At399 (SEQ ID NO:30)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPTH LKVSVSQVMD
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFKNTKVNP REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITQGIYAG ENRSMVMVSN LFRVGGAAIL LSNKSGDRRR SKYKLVTHTVR
 THTGADDKSF RCVQOQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
 LPLSEKFLFF ATEVAKKLLK DKIKHYYPVD FKLAVDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKW
 QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

FIGURE 1-5

[illegible]

MTSINVKLLY	HYVITNLFNL	CFFFLTAIVA	GKAYRLTIDD	LHLLYYSYLQ
HNLIITAPIF	AFTVFGSVLY	ITATRPKPYVL	VEYSCYLPTD	HCRSSISKVM
DIFFYQVRKD	PSRNGTCDDS	SWDLFLRKIQ	ERSGLGDETH	GPEGLLVQPP
RKTFAPAAARE	TEQVIGIALE	NLFKNTNVNP	KDIGLVVNS	SMFNPTPSLS
AMVVNTFKLR	NVRSFNLGG	MKCSAGVAIL	DLAKDLLVHH	KNTYALVVSZ
ENITYNYIAG	DNRSMVMVNSC	LFRVGGAAIL	LSNKGPDRRR	SKYELVHTVR
TLTGADGKFS	RCVQGGDDEN	GKIGVSLSKD	ITDVAGRTVC	KNIATLGLBI
LPHSGKLLFF	TVFMGKLFDE	DKIKHYVYVD	FKLAIDHFVI	HAGGAVRVIDE
LEKNLGLSPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKNKAW
QIALGSGFKC	NSAVVVALNR	VKASANSPOQ	HCIDRYPVKI	DSDLKSKSTH
VONGRS				

Bn G307D (SEO ID NO:34)

MTSINVKLLY	HYVITNLFNL	CFFFLTAIVA	GKAYRLTIDP	LHLLYYSYLQ
HNLIITIAPL	ASFTVGSVLY	ITATRPKPYVL	VEYSCYLTPD	HCRSSISKVM
DIFFYQRKAD	PSRNGTCDDS	IWLDFLRKIL	ERSGLGDETH	GPEGLLVQPP
RKTFAPAAARE	TEQVIGIALE	NLFKNTNVNP	KDIGLLVNS	SMFNPTPSLS
AMVVNTFKLR	SNVRSFNLGG	MGCSAGVAVI	DLAKDLLVHS	KNTYALVUST
ENITYNIYAG	DNRSMMVNSC	FLRVGGAAIL	LSNKGPDRRR	SKYELVHTVR
TLTGADDKFS	RCVQGGDDEN	GKIGVSLSKD	ITDVAGRTVK	KNIATLGLLI
LPHSEKLLFF	TVFMGKLFKF	KGIGVHYYPD	FKLAIDHFCI	HAGGARAVIDV
LEKNLALAPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKNKVW
QIALGSGFKC	NSAVVVALNN	VKASTNSPWE	HCIDRYPVKI	SDSGKSETRV
VONGRS				

At K92R (SEQ ID NO:36)

MTSVNVKLLY	RYLTFNFNLF	CLFPLTAFLA	GKASRLTND	LHNFLSYLQH
NLITVTLFLA	FTVFGLVLYI	VTWRNPVLYL	DYSCRLTPPH	LRSVSKVMD
IFYQIRKADD	SSRNACDDP	SSLDFLRKIY	ERSGLDETY	SPEGLHVPPM
RKTFAAASRE	TEKVIIGALE	NLFENTKVNP	REIGLLVUNS	SMEFNTPSLS
AMVNTVFKLR	ENKSMFLNG	MGCSAGVIAI	DLAKDLLVHH	KNTYALVUST
ENITQGIYAG	ENRSMVNSNC	FLRVGGAAIL	LSNKGSDRRR	SKYKLWTVTR
THTGADDSFR	RCVQGGDEES	GKIGVCLSKD	INTVAGTFTI	KNIATLGLPI
LPLESEKFLF	ATFVAKKLLD	DKIHKYVYDP	PKLAVDHTLC	HAGGRAVIDE
LEKNLGLSPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKNKAW
QIALGSGFKC	NSAVWVALRN	VKASANSWPQ	HCIDRYPVKI	DSDLKSKSTH
VONGRS				

FIGURE 1-6

At254 G307D (SEQ ID NO:38)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSXKVM
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFENTKVNPN REIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
LPLSEKLLFF VTFMGKKLFK DKIKHYYPDP FKLAIDHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKVV
QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

At173 G307D (SEQ ID NO:40)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSXKVM
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
LPLSEKLLFF VTFMGKKLFK DKIKHYYPDP FKLAIDHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKVV
QIALGSGFKC NSAVVVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

Bn399 G307D (SEQ ID NO:42)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFQVRKAD PSRNGTCDD SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGLPI
LPLSEKLLFF VTFMGKKLFK DKIKHYYPDP FKLAIDHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKAW
QIALGSGFKC NSAVVVALRN VKASANSFPW HCIDRYPVKI DSDLSKSKTH
VQNGRS

FIGURE 1-7

Arabidopsis thaliana FAEL (SEQ ID NO:1)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgtaaacggc gttcctcgcc ggaagacct
 ctccggttac cataaacgat ctccacaact tcttttctta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tctcgcctcg atttcctgag gaagattcaa gacggttcag
 gtctagggtg tgagacgtac agtcctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaaccacaa agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtca
 aagacttgtt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
 gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
 tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
 agtcggggaga ccggagacgg tccaagtaca agctagtcca caccgtccga
 acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
 cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
 ttgcggggac aacacttacg aaaaatatag caacattggg tccggtgatt
 ctctctttaa gcgaaaagt tcttttttcc gctaccttcg tcgccaaaga
 acttctaagg gataaaatca agcattacta tgtcccggtt ttaagcttg
 ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
 ctagagaaga acttaggact atcgccgatc gatgtggagg catctagatc
 aacgttacat agatttgga atacttcac tagctcaatt tggtatgaat
 tagcatatat agaggcaaa ggaagaatga agaaggga taaagcttgg
 cagattgtct taggatcagg gtttaagtgt aatagtccg ttgggtggc
 tctacgcaat gtcaaggcat cggcaaatag tccttgccaa cattgcatcg
 atagatatcc gggttaaaatt gattctgatt tgtcaaagtc aaagactcat
 gtccaaaacg gtcggtctcta atttgatgta tctgagtccc aacgtttact
 ttgtctttcc tttcttttat tggttatgaa tttagatgtt actaatgttc
 ctctcttttt cgttataaat aaagaagttc aattcttctt atagtttcaa
 acgcgatttt aagcgtttct atttaggttt acatgaattt cttttacaaa
 ccatctttt

FIGURE 2-1

Brassica napus elongase KCS (SEQ ID NO:3)

```

atgacgtcca ttaacgtaaa gctcctttac cattacgtca taaccaaacct
tttcaacctt tgcttctttc cgtaaacggc gatcgtcgcc ggaaaagcct
atcggtttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcgggtc
ggttctctac atcgcaacco ggcccaaacg ggtttacctc gttgagtact
catgctacat tccaccaacg cattgtagat caagtatctc caaggtcatg
gatattcttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaaactc atcgctctcc
gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagtcca acggttcga
acgcataccg gagctgacgg caagtctttt cgttgctgtc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctgtgctg aacggttaag aaaaacatag caacgttggg tccggttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaactg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgtttacat agatttgaa acacttcac tagctcaata tggtatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaaagct cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaaagtc agagactcgt
gtccaaaacg gtcggtccta ataa

```

FIGURE 2-2

B. napus elongase KCS (SEQ ID NO:5)

tagagcgtaa	cggaccacaa	aagaggatcc	atacaaatat	atctcatcgc
ttccattact	attctccgac	acacacactg	agcaatgacg	tccattaaacg
taaagctcct	ttaccattac	gtcataacca	accttttcaa	ctttgtgttc
tttccattaa	cggcgatcgt	cgccggaaaa	gcctatctta	ccatagacga
tcttcaccac	ttatactatt	cctatctcca	acacaacctc	ataaccattg
ctccactctt	ggccttcacc	gttttcggtt	cggttctcta	catcgcaacc
cggcccaaac	cggtttacct	cgtggagtac	tcatgtacc	ttccaccaac
gcattgtaga	tcaagtatct	ccaagggtcat	ggatatcttt	ttccaagtaa
gaaaagctga	tccttctcgg	aacggcactg	gcgatgactc	gtcctggcgtt
gacttcttga	ggaagattca	agaacgttca	ggcttaggcg	atgaaaccca
cgggcccag	gggctgcttc	aggtcctccc	ccggaagact	tttgcgcgcg
cgcgtgaaga	gacggagcaa	gttatcattg	gtgcgctaga	aaatctattc
aagaacacca	atgttaaccc	taaagatata	ggtatacttg	tgggtgaactc
aagcatgttt	aatccaactc	cttcgctctc	cgcgatgggtc	gttaacactt
tcaagctccg	aagcaacgta	agaagcttta	accttggttg	catggggtgt
agtgcggcgg	ttatagccat	tgatctagca	aaggacttgt	tgcatgtcca
taaaaaatcg	tatgctcttg	tgggtgagcac	agagaacatc	acttataaca
tttacgctgg	tgataatagg	tccatgatgg	tttcaaattg	cttgttccgt
gttgggtggg	ccgctatttt	gctctccaac	aagcctagag	atcgtagacg
gtccaagtac	gagctagttc	acacgggttcg	aacgcatacc	ggagctgacg
acaagtcttt	tcgtttcggtg	caacaaggag	acgatgagaa	cggccaaacc
ggagtgaatt	tgccaagga	cataaccgat	gttgctggtc	gaacggttaa
gaaaaacata	gcaacgctgg	gtccgttgat	tcttccgtta	agcgagaaac
ttcttttttt	cgttaccttc	atgggcaaga	aacttttcaa	agacgaaatc
aaacattatt	acgtcccggg	cttcaagctt	gctatcgacc	atttttgtat
acatgccgga	ggcaaagccg	tgattgatgt	gctagagaag	aacctaggcc
tagcaccgat	cgatgtagag	gcatcaagat	caacgttaca	tagatttgga
aacacttcat	ctagctcaat	atgggtatgag	ttggcataca	tagaacccaa
aggaaggatg	aagaaaggta	ataaaggttg	gcagattgct	ttagggtcag
gctttaagtg	taacagtgc	gtttgggtgg	ctctaacaac	tgtcaaaagt
tcaacaataa	gtccttgggg	acactgcac	gacagatacc	cgggttaaat
tgattctgat	tcaggtaaat	cagagactcg	tgtcccaaac	ggtcgggtcct
aataaatgat	gtttgctctc	tttcgtttct	ttttattggt	tataataatt
tgatggccac	gatgtttctc	ttgtttgtta	tgaataaaga	atcccacggt
gttctagtaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaa	

FIGURE 2-3

At114 (SEQ ID NO:7)

atgacgctccg ttaacggttaa gctcctttac cgttatgtct taaccaactt
 ttccaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaagaacct
 ctcggtctac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactggtt tcgggttggt
 tctctacatc gtaaccggac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tctcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgtatttttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataacc gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggctg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gatgtatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttcatat agatttgga acacttcac tagctcaata tggatgagt
 tggcatatcat agaagcaaaa ggaaggatga agaaaggtaa taagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcccaaacg gtcggtccta a

FIGURE 2-4

At74 (SEQ ID NO:9)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
 tttaaacctc tgtttgttcc cggttaacggc gttcctcgcc ggaaaaagcct
 ctccggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttgggt
 tctctacatc gtaacccgac ccaaacccggt ttacctcggt gagtactcat
 gctaccttcc accaacgcat tgtagatcaa gtatctccaa ggtcatggat
 atctttttatc aagtaagaaa agctgaccc tctcggaacg gcacgtgcga
 tgactcgtcg tggcttgact tcttgaggaa gattcaagaa cgttcagggtc
 taggcgatga aactcacggg cccgaggggc tgcttcagggt cctcccccgg
 aagacttttg cggcggcgcg tgaagagacg gagcaagtta tcattggtgc
 gctagaaaat ctattcaaga acaccaacgt taaccctaaa gatataggta
 tacttgtggt gaactcaagc atgtttaatc caactccatc gctctccggc
 atggtcggtta acactttcaa gctccgaagc aacgtaagaa gctttaacct
 tgggtggcatg ggttgttagtg ccggcggttat agccattgat ctgcaaagg
 acttgttgca tgtccataaa aatacgtatg ctcttgtggt gagcacagag
 aacatcactt ataacattta cgctgggtgat aataggcca tgatggtttc
 aaattgcttg ttccgtgttg gtggggccgc tattttgctc tccaacaagc
 ctggagatcg tagacggtcc aagtacgagc tagttcacac ggttcgaacg
 cataccggag ctgacggcaa gtcttttcgt tgcgtgcaac aaggagacga
 tgagaacggc aaaatcggag tgagtttgtc caaggacata accgatgttg
 ctggtcgaaac ggttaagaaa aacatagcaa cgttgggtcc gttgatctct
 ccgttaagcg agaaacttct ttttttcgtt acctcatgg gcaagaaact
 tttcaaagat aaaatcaaac attactacgt cccggatttc aaacttgcta
 ttgaccattt ttgtatacat gccggaggca gagccgtgat tgatgtgcta
 gagaagaacc tagccctagc accgatcgat gttaggcat caagatcaac
 gttacataga tttggaacaa cttcatctag ctcaatatgg tatgagttgg
 catacataga agcaaaaagga aggatgaaga aaggaataaa agtttggcag
 attgcttttag ggtcaggctt taagtgtaac agtgcagttt ggggtgctct
 aaacaatgtc aaagcttcga caaatagtc ttgggaacac tgcacgcaga
 gatccccggt caaaattgat tctgattcag gtaagtcaga gactcgtgct
 caaaacggtc ggtcctaa

FIGURE 2-5

At114 L91C K92R (SEQ ID NO:11)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctccggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aacottataa cagtaacttt actctttgct ttcactgttt tcggtttggg
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgat **tg**cagagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgataattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaaactcac gggcccagg ggcgtgctca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataaatggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgtatttttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tcttttttcc gttaccctta tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttggaa acacttcac tagctcaata tggatatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaacaat gtcaaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaaagtc agagactcgt
 gtcccaaacg gtcggtccta a

FIGURE 2-6

At114 K92R (SEQ ID NO:13)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttgttcc cgtaaaggc gttcctcgcc ggaaaagcct
 ctccggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcgggttggg
 tctctacatc gtaacccgac ccaatccggg ttatctcgtt gactactcgt
 gttaccttcc gccaccgat ctccagagtt ggtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttgggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcattgtccat aaaaaacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgtggtt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca caccggttcga
 acgcataccg gagctgacgg caagtctttt cgttgctgac aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccggtgatt
 ctcccgtaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tggatagagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg cttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaaagct cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggttaagtc agagactcgt
 gtcccaaacg gtcggtccta a

FIGURE 2-7

At114 G307D (SEQ ID NO:15)

atgacgctccg ttaacggttaa gctcctttac cgttatgtct taaccaactt
 ttccaacctc tgtttgttcc cgtaaacggc gttcctcgcc ggaaaagcct
 ctccggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggg
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gaetactcgt
 gttaccttcc gccaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgtaaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttgggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaaacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacgggtcga
 acgcataccg gagctgacga caagtccttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaactg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgaa acacttcac tagctcaata tggatagagt
 tggcatacat agaagcaaaa ggaaggatga agaaaaggtaa taaagtttg
 cagatttgct tagggtcagg ctttaagtgt aacagtgcag ttggggtggc
 tctaaacaat gtcaaaagct cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-8

At74 G306D (SEQ ID NO:17)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tggttggtcc cgttaacggc gttcctcgcc ggaaaagcct
 ctcgggttac cataaacgat ctccacaact tcttttctta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcgggttggt
 tctctacatc gtaacccgac ccaaacccgt ttacctcggt gagtactcat
 gctaccttcc accaacgcat tgtagatcaa gtatctccaa ggtcatggat
 atctttttatc aagtaagaaa agctgaccc tctcggaacg gcacgtgcga
 tgactcgtcg tggcttgact tcttgaggaa gattcaagaa cgttcagggtc
 taggcgatga aactcacggg cccgaggggc tgcctcagggt cctcctcccg
 aagacttttg cggcggcgcg tgaagagacg gagcaagtta tcattggtgc
 gctagaaaaa ctattcaaga acaccaacgt taaccctaaa gatataaggta
 tacttggtgt gaactcaagc atgtttaatc caactccatc gctctccgcg
 atggtcggtt acactttcaa gctccgaagc aacgtaagaa gctttaacct
 tgggtggcatg gggtgtagtg ccggcggttat agccattgat ctgacaaagg
 acttggttga tgtccataaa aatacgtatg ctcttggtgt gagcacagag
 aacatcactt ataacattta cgctgggtgat aatagggtcca tgaagggttc
 aaattgcttg ttcctgtgtg gtggggccgc tattttgctc tccaacaagc
 ctggagatcg tagacgggtcc aagtacgagc tagttcacac ggttcgaacg
 cataccggag ctgacgacaa gtcttttcgt tgcgtgcaac aaggagacga
 tgagaacggc aaaatcggag tgagtttgtc caaggacata accgatgttg
 ctggtcgaac ggtaagaaa aacatagcaa cgttgggttc gttgatctct
 ccgttaagcg agaaacttct ttttttcgtt accttcattg gcaagaaact
 tttcaaagat aaaatcaaac attactacgt cccggatttc aaacttgcta
 ttgaccattt ttgtatacat gccggaggca gagccgtgat tgatgtgcta
 gagaagaacc tagccctagc accgatcgat gttagggcat caagatcaac
 gttacataga tttggaaaca cttcatctag ctcaatatgg tatgagttgg
 catacataga agcaaaaagga aggatgaaga aaggttaata agtttggcag
 attgcttttag ggtcaggctt taagtgtaac agtcagttt gggtggctct
 aaacaatgtc aaagcttcga caaatagtc ttgggaacac tgcacgcaca
 gataccgggt caaaattgat tctgattcag gtaagtgcga gactcgtgtc
 caaacggctc ggtcctaa

FIGURE 2-9

At114 L91C K92R G307D (SEQ ID NO:19)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcgggttggg
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat **tgacagag**gtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgataattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcatgtg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttgggtggc atgggttgta gtgcggcggt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggc ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgtatttttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtagc agctagtcca cacggttcga
 acgcataccg gagctgacga **caagtc**tttt cgttgctgcg aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaacctca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgtttacat agatttgtaa acacttcac tagctcaata tggtatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
 cagattgctt tagggtcagg ctttaagtgt aacagtcag tttgggtggc
 tctaaacaat gtcaaaagct cgacaaaatag tccttgaggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcgttctta a

FIGURE 2-10

At114 K92R G307D (SEQ ID NO:21)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctccggttac cataaacgat ctccacaact tcttttccta tctccaacac
 aaccttataa cagtaacttt actcttttgc ttcactgttt tccggtttgg
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat ctccagagta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggtgcttca ggtccctccc
 cggaagactt ttgcgccggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgtctctc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttta
 ccttggtggc atgggtttga gtgccggcgt tatagccatt gatctagcaa
 aggactttgt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaatgct ttgttccgtg ttggtggggc cgtatttttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca caccgttcca
 acgcataccg gagctgacga caagtctttt cgttgcgctg aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgtctgctg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccgat ttcaaaactg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgtttacat agatttggaa acacttcatc tagctcaata ttgtatgagt
 tggcatatcat agaagcaaaa ggaaggatga agaaaggtaa taagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaaagct cgacaaatag tcttggggaa cactgcacgc
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaaacg gtcggtccta a

FIGURE 2-11

At254 (SEQ ID NO:23)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaagacgt
 ctccggttac cataaacgat ctccacaacc tcttttctta tctccaacac
 aaccttataa cagtaacttt actctttgct ttactgttt tcggtttggg
 tctctacatc gtaacccgac ccaatccggg ttatctcggt gactactcgt
 gttaccttcc accaccgat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tctctcgctc atttctgag gaagattcaa gagcgttcag
 gtctaggatg tgagacgtac agtcttgagg gactcattca cgtaccaccg
 cgggaagact ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaaccacaa agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgtatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
 aagacttgtt gcatgttcat aaaaacactt atgctctcgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccgatgggt
 ttcaaattgc ttgttccgtg ttggtggggc cgtattttg cttccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgtgagaaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgtgtgctg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttcggtaa gcgagaaact tcttttttcc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccgat tccaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttggaa acacttcac tagctcaata tggatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaacaat gtcaaacgtt cgacaatatg tccttgggaa cactgcacgt
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcccaaacg gtcggtccta a

FIGURE 2-12

At173 (SEQ ID NO:25)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
 tttcaacttc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctcgcgcttac cataaacgat ctccacaact tcccttcccta tctccaacac
 aaccttataa cagtaacttt actcttttgc ttactgtttt tcggttttgg
 tctctacatc gtaacccgac ccaatccggt ttatctcgtt gactactcgt
 gttaccttcc accaccgat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tccctcgctcg atttctgag gaagattcaa gacggttcag
 gtctaggtag tgagacgtac agtctctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattca agaaccacaa cgttaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaaactc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttta
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaatgac ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtagc agttagttca caccggttga
 acgcataccg gagctgacgg caagtctttt cgttgctgac aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgtctggtc aacggttaag aaaaacatag caacggtggg tccgttgatt
 cttcogttta gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccgat ttcaaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacggttacat agatttgga acacttcatc tagctcaata tggatagat
 tggcatatcat agaagcaaaa ggaaggatga agaaaggtta taaagtttgg
 cagattgtct tagggtcagg ctttaagtgt aacagtgacg tttgggtggc
 tctaaacaat gtcaaaagct cgacaaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaaagtc agagactcgt
 gtccaaaaacg gtcggtctcta a

FIGURE 2-13

Bn176 (SEQ ID NO:27)

atgacgtcca ttaacgtaaa gtcctcttac cattacgtca taaccaaccc
 ttccaacctt tgcttctttc cgtaaaccgc gatcgctgcc ggaaaagcct
 atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
 cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
 ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
 catgctacct tccaccaacg cattgtagat caagtatctc caaggctcatg
 gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
 cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaaactcac gggcccgagg ggtgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggtcg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
aagacttgtt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggg
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
agtcgggaga ccggagacgg tccaagtaca agctagtcca cacggtcgga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
tgatgagagc ggcaaaatcg gagtttgtct gtcaaaaggac ataaccaatg
ttgcggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttctttaa gcgaaaagt tcttttttct gctaccttcg tcgccaaaga
acttctaaag gataaaatca agcattacta tgttcgggat ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgac gatgtggagg catctagatc
aacgttacat agatttggga atacttcac tagctcaatt tggatatgaat
tagcatacat agaggcaaag ggaagaatga agaaggga taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttgccaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta a

FIGURE 2-14

At399 (SEQ ID NO:29)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctccggttac cataaacgat ctccacaact tcttttcta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tccggttggg
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tctcgcgtcg atttctgag gaagattcaa gagcgttcag
 gtctagggtg tgagacgtac agtctgagg gactcattca cgtaccaccg
 cgggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgcctcgaa aatctattcg agaaccacca agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttta
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttgcta
 aagacttgtt gcatgttcac aaaaacactt atgctcttgt ggtgagcact
 gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggg
 tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
 agtcgggaga cgggagacgg tccaagtaca agctagtcca cacgggtccga
 acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
 cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
 ttgcggggac aacacttacg aaaaatatag caacattggg tccggttgatt
 cttcctttaa gcgaaaagt tcttttttct gctaccttcg tccgcaagaa
 acttctaaag gataaaatca agcattacta tgttccggat ttcaagcttg
 ctggtgacca tttctgtatt catgcccggg gcagagccgt gatcgatgtg
 ctagagaaga acctagccct agcacccgac gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tggatagat
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcaaaaacg gtcggtctca a

FIGURE 2-15

Bn399 (SEQ ID NO:31)

atgacgtcca ttaacgttaa gtcctcttac cattacgtca taaccaacct
 tttcaacctt tgcttctttc cgttaacggc gatcgtcgcc ggaaaaagcct
 atcgggttac catagacgat ctccaccact tatactattc ctatctccaa
 cacaacctca taaccatcgc tccactcttt gcttcaccg ttttcgggttc
 ggttctctac atcgcaaccc ggcccaaac gggttacctc gttgagtact
 catgctacct tccaccaacg cattgtagat caagtatctc caaggctcatg
 gatatctttt atcaagtaag aaaagctgat ccttctcggg acggcacgtg
 cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgtttcag
 gtctaggcga tgaaaactcac gggcccagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaaactcc atcgtctctc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttgggtggc atgggtttgta gtgcggcggt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca caccggttca
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacggttggg tccgttgtatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgcat gatgtggagg catctagatc
aacgttacat agatttggga atacttcac tagctcaatt tggatatgaat
tagcatatc agaggcaaag ggaagaatga agaaaggga taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaaagtc aaagactcat
gtccaaaacg gtcggctcta a

FIGURE 2-16

Bn G307D (SEQ ID NO:33)

atgacgtcca	ttaacgtaaa	gctcctttac	cattacgtca	taaccaacct
tttcaacctt	tgcttcttct	cgttaacggc	gatcgctgcc	ggaaaagcct
atcggtttac	catagacgat	cttcaccact	tatactattc	ctatctccaa
cacaacctca	taaccatcgc	tccactcttt	gccttcaccg	tttctgggtc
ggttctctac	atcgcaaccc	ggcccaaacc	ggtttacctc	gttgagtact
catgttacct	tccaccaacg	cattgtagat	caagtatctc	caaggctatg
gatatctttt	atcaagtaag	aaaagctgat	ccttctcgga	acggcacgtg
cgatgactcg	tcgtggcttg	acttcttgag	gaagattcaa	gaacgttcag
gtctaggcga	tgaaactcac	gggcccgagg	ggctgcttca	ggtccctccc
cggaagactt	ttgcggcggc	gcgtgaagag	acggagcaag	ttatcattgg
tcgcgtagaa	aatctattca	agaacaccaa	cgttaacccct	aaagatatag
gtatacttgt	ggtgaactca	agcatgttta	atccaactcc	atcgctctcc
gcgatggctg	ttaacacttt	caagctccga	agcaacgtaa	gaagctttaa
ccttggtggc	atgggttgta	gtgccggcgt	tatagccatt	gatctagcaa
aggacttggt	gcatgtccat	aaaaatacgt	atgctcttgt	ggtgagcaca
gagaacatca	cttataacat	ttacgctggt	gataataggt	ccatgatggg
ttcaaatgac	ttggtccgtg	ttggtggggc	cgctattttg	ctctccaaca
agcctggaga	tcgtagacgg	tccaagtacg	agctagtcca	cacggttcga
acgcataaccg	gagctgacga	caagtccttt	cgttgctgtc	aacaaggaga
cgatgagaac	ggcaaaatcg	gagtgagttt	gtccaaggac	ataaccgatg
ttgctgttcg	aacggttaag	aaaaacatag	caacgttggt	tccgttgatt
cttccggtta	gcgagaaact	tctttttttc	gttaccttca	tgggcaagaa
acttttcaaa	gataaaatca	aacattacta	cgtcccggat	ttcaaaactg
ctattgacca	tttttgata	catgccggag	gcagagccgt	gattgatgtg
ctagagaaga	acctagccct	agcaccgatc	gatgtagagg	catcaagatc
aacggttacat	agatttggaa	acacttcata	tagctcaata	tggtatgagt
tggcatacat	agaagcaaaa	ggaaggatga	agaaaggtaa	taaagtttgg
cagattgctt	tagggtcagg	ctttaagtgt	aacagtgcag	tttgggtggc
tctaaacaat	gtcaaaagct	cgacaaatag	tccttgggga	cactgcatcg
acagataccc	ggtcaaaatt	gattctgatt	caggtaaagtc	agagactcgt
gtccaaaacg	gtcggctcta	ataa		

FIGURE 2-17

At K92R (SEQ ID NO:35)

atgacgtccg ttaacgtaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggg
tctctacatc gtaacccgac ccaatccggg ttatctcggt gactactcgt
gttaccttcc accaccgat ctc**agag**tta gtgtctctaa agtcatggat
atthtctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttctgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtctcgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaaccacaa agttaaccct agagagattg
gtatactgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggtcg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttgagcta
aagactttgt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggg
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctotaaca
agtcgggaga ccggagacgg tccaagtaca agtagttca cacggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttcgqgggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcttttaa gcgaaaagt tctttttttc gctaccttcg tcgccaagaa
acttctaaag gataaaatca agcattacta tgttccggtt ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcggccgatc gatgtggagg catctagatc
aacgttacat agatttggga atacttcatc tagctcaatt tggatgaat
tagcatatc agagggcaag ggaagaatga agaaaggga taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg ttggggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttgggca cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgcataagtc aaagactcat
gtcctaaaac gtcggtccta atttgatgta tctgagtgcc aacgtttact
ttgtctttcc tttcttttat tggttatgaa ttgatgtttt actaatgttc
ctctcttttt cgttataaat aaagaagttc aattcttctt atagtttcaa
acgcgatttt aagcgtttct atttaggttt acatgaattt cttttacaaa
ccatctttt

FIGURE 2-18

At254 G307D (SEQ ID NO:37)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctccggttac cataaacgat ctccacaact tcttttctta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tctcgcgtcg atttctgag gaagattcaa gagcgttcag
 gtctagggtg tgagacgtac agtctgagg gactcattca cgtaccaccg
 cgggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaaccacaa agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagcttttaa
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
 aagacttggt gcatgttcat aaaaacactt atgctctcgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacg tccaagtacg agctagtcca cagggttcca
 acgcataccg gagctgacga caagctcttt cgttgctgic aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgtttgg tccgttgatt
 cttcgtttaa gcgagaaact tcttttttct gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgac gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tggatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaagtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaaagct cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcacaaaac gtcggtctca a

FIGURE 2-19

At173 G307D (SEQ ID NO:39)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc gaaaaagcct
 ctccggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggg
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tcctcgctcg atttctgag gaagattcaa gagcgttcag
 gtctagggtg tgagacgtac agtcctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattca agaacaccaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgtctctc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagcttta
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cagggttcca
 acgcataccg gagctgacga caagtccttt cgttgctgac aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaaactg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgtttacat agatttgtaa acacttcac tagctcaata tggatatgag
 tggcatatat agaagcaaaa ggaaggatga agaaagttaa taaagtttg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaaagct cgacaaatag tccttgggaa cactgcacgt
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcacaaaac gtcggtccta a

FIGURE 2-20

Bn399 G307D (SEQ ID NO:41)

atgacgtcca ttaacgttaa gtccttttac cattacgtca taaccaacct
 tttcaacctt tgcttctttc cgttaacggc gatcgctgcc ggaagagcct
 atcgggttac catagacgat cttcaccact tatactattc ctatctccaa
 cacaaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
 ggttctctac atcgcaaccc ggcccaaacg ggtttacctc gttgagtagt
 catgctacct tccaccaacg cattgtagat caagtatctc caagggtcatg
 gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
 cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccagg ggctgcttca ggtccctccc
 cggaagactt ttgctggcggc gctggaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgtatttttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtgtc cacgggttca
 acgcataccg gagctgacga caagctcttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgaagtt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tcttttttcc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gatcgatgag
 ctagagaaga acttaggact atcgccgac gatgtggagg catctagatc
aacgtttacat agatttggga atacttcac tagctcaatt tggatgaat
tagcatacat agaggcaag ggaagaatga agaaaggaa taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
ttacgcgaat gtcaaggcat cggcaaatag tccttgqcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgcaaaagtc aaagactcat
gtccaaaaacg gtcggtctca a

FIGURE 2-21